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AESO/SE
2-21-02-F-101 April 19, 2002

Mr. John C. Bedell
Forest Supervisor
Apache-Sitgreaves National Forests
P.O. Box 640
Springerville, Arizona 85938-6357

RE: Apache Trout Enhancement Project

Dear Mr. Bedell:

This biological opinion responds to your request for consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated February 14, 2002, and received by us on February 19, 2002. At issue are impacts that may result from the proposed Apache Trout Enhancement Project on Apache trout (*Oncorhynchus apache*), Little Colorado spinedace (*Lepidomeda vittata*), loach minnow (*Tiaroga cobitis*) and its critical habitat, bald eagle (*Haliaeetus leucocephalus*), and Mexican spotted owl (*Strix occidentalis lucida*), located on the Apache-Sitgreaves National Forest (A-S) in Apache and Greenlee counties, Arizona.

This biological opinion is based on information provided in the January 16, 2002, Biological Assessment and Evaluation for the Effects of Barrier Construction, Restoration, and Subsequent Stocking and Reintroduction of Apache trout in Waters of the Black and Little Colorado River Watersheds; the February 20, 2002 Biological Assessment and Evaluation, Apache Trout Enhancement Projects, Listed and Proposed Terrestrial Species; draft environmental assessment, telephone conversations with Jerry Ward and Terry Myers, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, fish reintroductions including barrier constructions and use of fish toxicant Antimycin-A, and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

In September 2000, the Forest and the Service began informal consultations regarding the Apache trout reintroduction project. Numerous emails from the Service to the Forest outlined the Service's initial concerns regarding the project. On February 19, 2002, the Service entered into formal consultation with the Forest for the reintroduction of Apache trout into streams on the (A-S). The Forest requested an expedited consultation period to meet on the ground work items. The Service, therefore, agreed to provide a final biological opinion within 60 days of initiation.

In a February 14, 2002 letter, the Forest requested a concurrence that the proposed action was not likely to adversely affect the endangered jaguar (*Panthera onca*) and southwestern willow flycatcher (*Empidonax traillii extimus*). In addition, the Forest determined that the proposed action will not jeopardize the continued existence of the Mexican gray wolf (*Canis lupus baileyi*) and the proposed Chiricahua leopard frog (*Rana chiricahuensis*). Concurrences for these species was issued to the Forest in a letter dated February 28, 2002 by the Service.

Numerous telephone calls and discussions have occurred over the course of this consultation. A meeting was held on April 4, 2002 in Pinetop Arizona with the Forest Service, Arizona Game and Fish Department (AGFD), the Service's Pinetop Fishery Resource Office, and the Arizona Ecological Service Field Office (AESO) to discuss the project. Since a draft Biological Opinion was not issued, discussions focused on the time line of the project, effects of the actions, and ideas which would minimize take.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Seven new fish barriers will be constructed, and three existing fish barriers will be heightened to further reduce the potential for upstream passage of non-native salmonids. One fish barrier will be constructed on the West Fork Black River, two on the East Fork Little Colorado River, two on the South Fork Little Colorado River, and two on the West Fork Little Colorado River. Fish barriers that are to be heightened are located on Centerfire Creek, Fish Creek, and Hayground Creek. Stream renovations and reintroductions of Apache trout will occur on Bear Wallow Creek, East Fork Little Colorado River, Fish Creek, Hayground Creek, Lee Valley Creek, Snake Creek, South Fork Little Colorado River, Stinky Creek, West Fork Black River, and West Fork Little Colorado River. Tables 1 and 2 outline the activities associated with each stream and the schedule of completion for the activities. Detailed maps showing the location of the streams involved in the project are found in Appendix A, Map 1 (Little Colorado River system) and Map 2 (Black River system).

Table 1: Summary of proposed actions.

Water System	New Barrier Number	Barrier Reconstruction	Antimycin-A Treatment	Native Fish Salvage	Stocking Strain
BLACK RIVER WATERSHED					
West Fork Black River	Yes (1)	No	Yes	Yes	East Fork White River trout
Bear Wallow Creek	No	No	Yes	Yes	Little Bonito Strain
Centerfire Creek	No	Yes	No	No	No Stocking Planned
Fish Creek	No	Yes	Yes	Yes	Per Future Recovery Plan Goals
Snake Creek	No	No	Yes	Yes	Solider Creek Strain
Hayground (Hay) Creek	No	Yes	Yes	Yes	Elk Canyon Creek Apache trout
Stinky Creek	No	No	Yes	Yes	Deep Creek Strain
LITTLE COLORADO RIVER WATERSHED					
East Fork Little Colorado River	Yes (2)	No	Yes	Yes	Big Bonito Creek Apache trout
Lee Valley Creek	No	No	Yes	Yes	East White River Strain
South Fork Little Colorado River	Yes (2)	No	Yes	Yes	Boggy/Lofer Creek Apache trout
West Fork Little Colorado River	Yes (2)	No	Yes	Yes	East White River Apache trout

Table 2: Schedule of Proposed Activities

Water System	Barrier Activities	Stream Renovation	Reintroduction
BLACK RIVER WATERSHED			
West Fork Black River	2004	2005	2005
Bear Wallow Creek	N/A	2002 (Sep.-Oct.)	2003 (Summer)
Centerfire Creek	2003 (Fall)	N/A	N/A
Fish Creek	2003 (Summer)	2003 (Sep.)	2003
Snake Creek	N/A	2002 (Sep.-Oct.)	2003 (Summer)
Hayground (Hay) Creek	2002 (Summer)	2002 (Sep.-Oct.)	2003
Stinky Creek	N/A	2002 (Jun.-Jul.)	2002 (Fall)
LITTLE COLORADO RIVER WATERSHED			
East Fork Little Colorado River	2002-lower 2003-upper	2002 (Jun.-Jul.)	2002 (Fall)
Lee Valley Creek	N/A	2002 (Jun.-Jul.)	2002 (Fall)
South Fork Little Colorado River	2002-lower 2002-upper	2003 (Jun.-Jul.)	2003 (Fall)
West Fork Little Colorado River	2002-lower 2003-upper	2003 (Jun.- Jul.)	2003

PROPOSED ACTIONS AND ACTION AREA

General Information on Barrier Construction and Stream Renovation

Barrier construction is briefly outlined in Appendix B of this document. A complete description of the process can be found in the EA (USFS 2002a). The location of each specific fish barrier is described later in this document. After barrier construction, renovation of the stream will take place with the use of the fish toxicant Antimycin-A.

Pre-renovation activities will begin with personnel identifying public access areas, drip station locations, and difficult treatment sites that will require backpack spraying. Difficult treatment sites include backwaters, seeps, and springs not influenced by the streams flow. A hip chain will be used to measure distances, and flagging will be placed to mark drip station locations. In addition, detoxification sites will be marked. An additional station will be placed further downstream in the event that the primary detoxification station fails to fully detoxify treated water.

Measurement of stream discharge and physical parameters (pH and water temperature) throughout the treatment area will be taken. This data will be used to estimate the amount of Antimycin-A and potassium permanganate needed. A bioassay using caged fish (non-native trout) will then be conducted to determine toxicant concentrations (typically 10 to 20 ppb), and distances between drip stations (typically 328 to 492 feet (ft)). A final determination of the amount of Antimycin-A to be used will be made using label directions and the bioassay results.

A salvage of resident native fish will be conducted prior to treatment. Fish will be captured using one or more battery-powered backpack electrofishers. Salvaged fish will be transported by truck to Pinetop Fish Hatchery. Following a successful renovation, salvaged fish will be returned to the treated area.

When acceptable weather conditions occur, a field crew will add pre-determined amounts of Antimycin-A to the water in each drip station and the drip stations will be activated. A second field crew will then begin the backpack sprayer application. Addition of Antimycin-A, activation of each drip station and backpack sprayer application will occur sequentially, on an upstream to downstream basis. When drip stations are empty, they will be rinsed with stream water, which will be poured into the stream. Stations will then be dismantled and collected. During the treatment period, drip stations will be monitored to ensure that all deployed sites are operating properly, and the stream and access areas will be patrolled to ensure that recreationists are advised of the treatment.

Detoxification of stream water with potassium permanganate will start at least one hour before Antimycin-A is expected at the downstream end of the treatment area, and will continue for at least 24 hours after the calculated end of the antimycin treatment. Staff will remain onsite for the duration of detoxification to continuously monitor the flow from the detoxification station.

Nonnative trout will be placed in a live car approximately 984 ft downstream of the primary detoxification site. Monitoring will determine if fish in the live car begin dying because of incomplete detoxification at the primary station. If this occurs, the next downstream detoxification station will be activated. Dead fish throughout the treatment area will be collected and disposed. The approximate total number of dead fish is yet to be determined.

Following the treatment, two complete visual surveys and two complete electrofishing surveys, utilizing battery powered backpack electrofishers, will be conducted to evaluate the success of the renovation. If live fish are collected or observed, a second deployment of Antimycin-A will be planned. In addition, macroinvertebrates within the treatment area will be monitored to evaluate their recovery.

As part of the proposed release, hatchery trucks containing Apache trout, and vehicles transporting personnel, and pack animals will meet at staging areas. At each staging area, fish will be transferred from the hatchery truck to containers for transport by personnel and/or pack animals. Trout will be released directly into various rivers above the fish barriers. The entire release will be accomplished within 24 hours from the time trout are initially transferred into the hatchery truck.

Some aspects of the proposed actions will be implemented under existing permits issued by the AGFD and the Service. These actions include sampling of rivers prior to the reintroduction of Apache trout (AGFD and Forest personnel), and the collection, manipulation, holding, and transport of Apache trout during their retrieval from the wild or hatchery, until their release (AGFD and Service personnel). These actions, which may affect Apache trout involved in the proposed action, are already permitted by the Service and do not require additional consultation under the Act.

Specific locations of barrier placements are described below. A more specific account can be found in the EA (USFS 2002a).

West Fork Black River

The location of the fish barrier to be constructed is approximately 0.6 miles (mi) below Forest Road 25, which is approximately 0.5 mi above the confluence with the East Fork Black River. Vehicle and equipment access to the site will be by an existing road off of Forest Road 25H.

The West Fork Black River fish barrier will be the largest of all the barriers being proposed for construction. The overall structure length will be 102 ft; with a spillway length of 41 ft, right wing length of 35 ft, and left wing length of 26 ft. The pool created upstream of the fish barrier will be 418 ft in length and a maximum of 90 ft in width. The area of this pool will be less than 0.6 acres and will inundate less than 0.5 acres of riparian vegetation, and will store less than 1.75 acre-ft of water. Construction of this barrier will add a maximum of 5925 cubic feet ft^3 of material to the 100-year floodplain; 1275 ft^3 in the right wing, 1000 ft^3 in the left wing, 3275 ft^3 in the spillway, and 375 ft^3 of backfill.

This site is adjacent to an existing Forest Service road, therefore vehicles and equipment will have direct access to this site. Materials will be placed primarily by hand, but some (approximately 40%) will be placed with equipment (backhoe, front-end loader, excavator, etc.). No material is available in the immediate project area, so the material will be transported to the site from one Forest Service rock pit located approximately 22 mi from the barrier site.

Bear Wallow Creek

The renovation of Bear Wallow Creek and its perennial tributaries, and the reintroduction of Little Bonito Creek Apache trout will directly involve the aquatic habitats of Bear Wallow Creek and its perennial tributaries. In addition, actions associated with the reintroduction cause other habitats, such as the staging area at the junction of Forest Road 25 and Forest Trail 62, the base camp at the confluence of North and South Fork Bear Wallow Creek, Forest trails 62, 63, 317, and 816, and the Black River to be considered as a part of the action area.

Centerfire Creek

The Centerfire Creek fish barrier is located just downstream of the confluences of Boggy and Wildcat creeks, which is approximately 2 mi upstream of the confluence of Centerfire Creek with the Black River. Vehicle and equipment access will be by an existing road off of Forest Road 8335. From here access will be by trail for one-quarter mile to Wildcat Creek, then down Wildcat Creek one-third of a mile to the confluence of Boggy Creek, where the barrier is only 100 ft below the confluence.

Reconstruction activities will include raising the level of the spillway, and the left and right wings of the current structure. The spillway will be raised 1.5 ft for a length of 20 ft (additional 90 ft^3 of volume), the right wing will be raised one foot for a length of 24 ft (additional 72 ft^3 of volume), and the left wing will be raised 3 ft for a length of 6 ft (additional 54 ft^3 of volume). Back filling of the new structure will require an additional 30 ft^3 of material, which will result in a total of 246 ft^3 of material being added to the 100-year floodplain. The size of the new pool upstream will be a maximum of 25 ft wide by 60 ft long, and store an additional 1500 ft^3 of water.

This site is only accessible by foot, and all materials will be placed by hand. There is no concentrated rock source near the barrier, so the material for this project will be gathered from the adjacent uplands and placed by hand. Approximately 75% will be cobble material [(4-10 inches (in)], 20% will be small boulders (10-16 in), and 5% will be gravel and sand. The gravel and sand will be brought to the site on foot and placed by hand.

Fish Creek

The Fish Creek fish barrier is located approximately one mile upstream of the confluence of Fish Creek with the Black River. The fish barrier will be modified by heightening the spillway and the right and left wings of the present structure. There will be three access routes into Fish Creek, one off of Forest Road 25, and two off of Forest Road 83A. Access by Forest Road 25 will involve trailing up the Black River to the Fish Creek confluence, then up Fish Creek for about one-quarter mile. Access by Forest Road 83A will involve trailing to Fish Creek from the east by Trail #320 and an unnumbered trail, then trailing down Fish Creek 0.5 and 2 mi, respectively.

If required, the renovation of Fish Creek and its perennial tributaries, and the reintroduction of Apache trout will directly involve the aquatic habitats of Fish Creek and its perennial tributaries, as well as Ackre Lake. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the base camps at Double Cienega off of Forest Road 25B, and the area off of Forest Road 83A (Township 3½ North, Range 28 East, Section 13), Forest Trails 320 and 60, and the Black River to be considered as a part of the action area.

Reconstruction activities will include raising the level of the spillway, and the left and right wings of the current structure. The spillway will be raised 1.5 ft for a length of 20 ft (additional 90 ft^3 of volume), the right wing will be raised 1.5 ft for a length of 6 ft (additional 27 ft^3 of volume), and the left wing will be raised 3 ft for a length of 10 ft (additional 90 ft^3 of volume). Back filling of the new structure will require an additional 30 ft^3 of material, which will result in a total maximum volume of 237 ft^3 of material added to the 100-year floodplain. The size of the new pool upstream will be a maximum of 25 ft wide by 60 ft in length, and store an additional 1500 ft^3 of water.

This site is only accessible by foot or horseback, and all materials will be placed by hand. There is no concentrated rock source near the barrier, so the material for this project will be gathered from the adjacent uplands and placed by hand. Approximately 65% of the material will be cobble material (4-10 in), 30% will be small boulders (10-16 in), and 5% will be gravel and sand. The gravel and sand will be brought to the site on foot or horseback and placed by hand.

Snake Creek

The renovation of Snake Creek and its perennial tributaries, and the reintroduction of Soldier Creek Apache trout will directly involve the aquatic habitats of Snake Creek and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging area/base camp located where Forest Road 25D crosses Snake Creek, the area of the secondary camp southwest of McKibbins Pond, on the point above the confluence of Snake Creek and Black River, and the Black River to be considered as a part of the action area.

Hayground (Hay) Creek

The Hayground Creek fish barrier is located 0.2 mi upstream of the confluence with the West Fork Black River. Vehicle and equipment access will be to the end of Forest Road 68A at the West Fork Campground, from there trailing will occur for one mile up the West Fork Black River and then 0.2 mi up Hayground Creek.

The renovation of Hayground Creek and its perennial tributaries, and the reintroduction of Elk Canyon Apache trout will directly involve the aquatic habitats of Hayground Creek and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging area/base camp along an unnumbered Forest Road at Hayground (north half of the southwest quarter of Section 12 in Township 5 North, Range 27 East), the secondary camp at the West Fork Campground, and West Fork Black River, to be considered as a part of the action area.

Reconstruction activities will include raising the level of the spillway, and the left and right wings of the current structure. The spillway will be raised 2 ft for a length of 16 ft (additional 96 ft^3 of volume), the right wing will be raised 3 ft for a length of 12 ft (additional 108 ft^3 of

volume), and the left wing will be raised 3 ft for a length of 31 ft (additional 279 ft^3 of volume). Back filling of the new structure will require an additional 100 ft^3 of material, which will result in a total of 583 ft^3 of material being added to the 100-year floodplain. The size of the new pool upstream will be a maximum of 25 ft wide by 40 ft in length, and store an additional 1000 ft^3 of water.

This site is only accessible by foot or horseback, and all materials will be placed by hand. Immediately adjacent to the existing barrier is a natural rock flow, and this will be the source of material for this project. Approximately 80% will be cobble material (4-10 in), 15% will be small boulders (10-16 in), and 5% will be gravel and sand. The gravel and sand will be brought to the site on foot or horseback.

Stinky Creek

The renovation of Stinky Creek and its perennial tributaries, and the reintroduction of Deep Creek Apache trout will directly involve the aquatic habitats of Stinky Creek and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging area/base camp along the old railroad grade near where it crosses Stinky Creek to be considered as a part of the action area.

East Fork Little Colorado River

Two fish barriers will be constructed on this stream. The lower barrier will be located approximately 2 mi upstream of the confluence with the West Fork Little Colorado River, and the upstream barrier will be located approximately 2.5 mi upstream of the confluence. Access to the sites will be from three different routes. Trailing up the stream from the end of Forest Road 8079 for approximately 1.5 mi, trailing from the end of an unnumbered road off of Forest Road 8359B for approximately 0.5 mi, and trailing from the end of two unnumbered roads off of Forest Road 409 for approximately 0.75 and 1 mi.

The renovation of the East Fork Little Colorado River and its perennial tributaries, and the reintroduction of Big Bonito Creek Apache trout will directly involve the aquatic habitats of the East Fork Little Colorado River and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging area/base camp near Phelps Cabin, the secondary camp along Forest Road 409 nearest the lower most barrier, Forest roads 113 and 113G, Forest Trail 95, Bunch, Tunnel, and River reservoirs (Greer Lakes), and the area around the confluence of the South Fork and the Little Colorado River to be considered as a part of the action area.

The overall structure length of the lower barrier will be 101 ft; with a spillway length of 20 ft, right wing length of 16 ft, and left wing length of 31 ft. The pool created upstream of the fish barrier will be 84 ft in length and a maximum of 62 ft in width. The area of this pool will be less than 0.1 acres and will inundate less than 0.06 acres of riparian vegetation, and will store less

than 0.2 acre-ft of water. Construction of this barrier will add a maximum of 1500 ft^3 (56 yd^3) of material to the 100-year floodplain; 250 ft^3 in the right wing, 600 ft^3 in the left wing, 500 ft^3 in the spillway, and 150 ft^3 of backfill.

The overall structure length of the upper barrier will be 42 ft; with a spillway length of 12 ft, right wing length of 15 ft, and left wing length of 15 ft. The pool created upstream of the fish barrier will be 25 ft in length and a maximum of 27 ft in width. The area of this pool will be less than 0.02 acres and will inundate less than 0.02 acres of riparian vegetation, and will store less than 0.06 acre-ft of water. Construction of this barrier will add a maximum of 1500 ft^3 (56 yd^3) of material to the 100-year floodplain; 250 ft^3 in the right wing, 600 ft^3 in the left wing, 500 ft^3 in the spillway, and 150 ft^3 of backfill.

This site is only accessible by foot or horseback, and all materials will be placed by hand. Adjacent to the construction site of this fish barrier are several natural rock flows, which will be the source of materials for this site. A rock and mortar and/or cement layer will be placed over the gabion core of this barrier.

Lee Valley Creek

The renovation of Lee Valley Creek and its perennial tributaries, and the reintroduction of East White River Apache trout will directly involve the aquatic habitats of Lee Valley Creek and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging area at the Lee Valley Reservoir parking lot, and Lee Valley Reservoir to be considered as a part of the action area.

Apache trout that are reintroduced in Lee Valley Creek and its perennial tributaries may, through time, disperse (passively or actively) downstream below the barrier and into Lee Valley Reservoir. At this time, Lee Valley Reservoir is managed as an Apache trout sport fishery with special regulations and recruitment of Apache trout from Lee Valley Creek will support that fishery.

South Fork Little Colorado River

Two fish barriers will be constructed on this stream. The lower barrier will be located 0.1 mi upstream of the South Fork Campground, and the upper barrier will be located approximately 1.6 mi upstream of the South Fork Campground. Vehicle and equipment access to the lower barrier site will be by Forest Road 560. Vehicle and equipment access to the upper site will be by Forest Road 8070A.

The renovation of South Fork Little Colorado River and its perennial tributaries, and the reintroduction of Boggy/Lofer Creek Apache trout will directly involve the aquatic habitats of South Fork Little Colorado River and its perennial tributaries. In addition, actions associated with the renovation and reintroduction cause other habitats, such as the staging areas/base camps at Forest Road 409 crossing of South Fork and South Fork Campground, Forest Trail 97, and the confluence area of the South Fork and the Little Colorado River are to be considered as a part of the action area.

The overall structure length of the lower barrier will be 53 ft; with a spillway length of 20 ft, right wing length of 21 ft, and left wing length of 12 ft. The pool created upstream of the fish barrier will be 66 ft in length and a maximum of 36 ft in width. The area of this pool will be less than 0.05 acres and will inundate less than 0.04 acres of riparian vegetation, and will store less than 0.2 acre-ft of water. Construction of this barrier will add a maximum of 1400 ft^3 (52 yd^3) of material to the 100-year floodplain; 425 ft^3 in the right wing, 250 ft^3 in the left wing, 550 ft^3 in the spillway, and 175 ft^3 of backfill.

The overall structure length of the upper barrier will be 52 ft; with a spillway length of 16 ft, right wing length of 22 ft, and left wing length of 14 ft. The pool created upstream of the fish barrier will be 65 ft in length and a maximum of 50 ft in width. The area of this pool will be less than 0.05 acres and will inundate less than 0.03 acres of riparian vegetation, and will store less than 0.2 acre-ft of water. Construction of this barrier will add a maximum of 1100 ft^3 (41 yd^3) of material to the 100-year floodplain; 300 ft^3 in the right wing, 275 ft^3 in the left wing, 425 ft^3 in the spillway, and 100 ft^3 of backfill.

This site is adjacent to an existing Forest Service road, therefore vehicles and equipment will have direct access to this site. Materials will be placed primarily by hand, but some (approximately 40%) will be placed with heavy equipment (backhoe, front-end loader, excavator, etc.). No material is available in the immediate project area, so the material will be transported to the site from two Forest Service locations. One source is located approximately 2 mi from the barrier site, and the other source is approximately 26 mi from the fish barrier site.

West Fork Little Colorado River

Two fish barriers will be constructed on this stream. The lower barrier will be located approximately 1.4 mi upstream of the confluence with the East Fork Little Colorado River, and the upper barrier will be located approximately 2.75 mi upstream of the confluence. Access to the sites will be from three different routes. Trailing up the stream from the end of Forest Road 575 for approximately 0.75 and 2 mi, trailing from the end of an unnumbered road off of Forest Road 45 (Highway 273) for approximately 0.75 mi, and trailing from Winn Campground near Winn Sink for approximately 0.75 mi.

The overall structure length of the lower barrier will be 101 ft; with a spillway length of 20 ft, right wing length of 45 ft, and left wing length of 36 ft. The pool created upstream of the fish barrier will be 100 ft in length and a maximum of 63 ft in width. The area of this pool will be less than 0.1 acres and will inundate less than 0.06 acres of riparian vegetation, and will store less than 0.6 acre-ft of water. Construction of this barrier will add a maximum of 2150 ft^3 (80 yd^3) of material to the 100-year floodplain; 850 ft^3 in the right wing, 575 ft^3 in the left wing, 550 ft^3 in the spillway, and 175 ft^3 of backfill.

The overall structure length of the upper barrier will be 61 ft; with a spillway length of 10 ft, right wing length of 31 ft, and left wing length of 20 ft. The pool created upstream of the fish barrier will be 40 ft in length and a maximum of 50 ft in width. The area of this pool will be less than 0.05 acres and will inundate less than 0.02 acres of riparian vegetation, and will store less

than 0.1 acre-ft of water. Construction of this barrier will add a maximum of 750 ft^3 (28 yd^3) of material to the 100-year floodplain; 225 ft^3 in the right wing, 160 ft^3 in the left wing, 275 ft^3 in the spillway, and 90 ft^3 of backfill.

This site is only accessible by foot or horseback, and all materials will be placed by hand. Adjacent to the construction site of this fish barrier are several natural rock flows, which will be the source of material for this site. A rock and mortar and/or cement layer will be placed over the gabion core of this barrier. The mortar, cement, gravel and sand will be brought to the site on foot or horseback and placed by hand.

STATUS OF THE SPECIES (range wide and/or recovery unit)

APACHE TROUT

Apache trout is a medium-sized fish listed as endangered in 1967 under the Act, and reclassified to threatened in 1975. Critical habitat has not been designated. Apache trout lives in small headwater streams using pools for resting and riffles for feeding. It spawns in spring and early summer over gravel substrates. Apache trout feeds mainly on aquatic insects.

Apache trout were formally described by R.R. Miller. Based on Miller's (1972) examination of museum specimens, it is believed the 19th century distribution of Apache trout included the White and Black river drainages, the headwaters of the Little Colorado drainage and the Blue River. These streams are all within close proximity in the White Mountains, Arizona. According to the Apache Trout Recovery Team (USFWS 2001b), the former widespread distribution of Apache trout in the Black, White, and Little Colorado river (LCR) drainages is confirmed by present hybrid populations and documented collections (Loundenslager et al 1986, Carmichael et al. 1993). Many early White Mountain area settlers reported the abundant presence of native trout, which they referred to as yellow-bellied, speckled trout (Miller 1972, USFWS 1983). Survey records from the 1980's (Rinne and Minckley 1991, Loundenslager et al. 1986, Dowling and Childs 1992, Carmichael et al. 1993) indicated that populations of Apache trout still remained in several streams of the Fort Apache Indian Reservation and Apache-Sitgreaves National Forest.

Habitat loss and degradation from cattle grazing, logging, mining, agriculture, road construction, water diversions and reservoir construction, along with over-fishing, predation, hybridization and competition from non-indigenous trout, have greatly reduced Apache trout distribution and numbers. Many watersheds formerly inhabited by Apache trout have been routinely stocked with non-native rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*), brook trout (*Salvelinus fontinalis*), or brown trout (*Salmo trutta*) since the early 1900s (Silvey 1984). Non-indigenous salmonids exhibit tendencies to out compete Apache trout for resources such as food, cover, and other similar niche requirements, and to prey on them. Such competition from brown trout and brook trout has been identified as a cause of the decline of Apache trout (Rinne et al. 1981, Rinne and Minckley 1991, Carmichael et al.1993). Cutthroat and rainbow trout were

spread extensively by stocking over the entire range of Apache trout, although natural barriers prevented hybridization in some watersheds. Hatchery and management records from Williams Creek National Fish Hatchery, the Service, and AGFD indicate that cutthroat trout were stocked from at least 1920 to 1942. Similar records indicate that rainbow trout were widely stocked between 1934 and 1954. Some non-indigenous trout stocking still occurs today. Lately, the list of known introduced fish species has grown to more than 80. Most of these species were purposeful introductions, placed in Arizona waters in an attempt to increase the diversity of sport fishing.

The only pure populations of Apache trout remaining by the 1950s were those that were isolated in headwater streams where non-native trout were not stocked, most of which were upstream of natural waterfalls. These created natural barriers to upstream movement of non-native trout. By the 1960s, pure Apache trout populations had been reduced from a range of about 600 mi of stream to a low of about 30 mi (Harper 1978). The White Mountain Apache Tribe under took first attempts at conservation of Apache trout in the late 1940s and early 1950s when the only known populations existed on the Fort Apache Indian Reservation. In 1955, all Mt. Baldy streams on the reservation were closed to fishing. In 1963, the AGFD created hatchery brood fish populations at Sterling Springs State Fish Hatchery and stocking of Apache trout began throughout Arizona for both restoration and sport fishing from this initial hatchery program. In 1983, the Service began rearing Apache trout at the Williams Creek National Fish Hatchery on the Fort Apache Indian Reservation and it is now the principal rearing facility. Due to the great success in management and hatchery rearing, delisting of Apache trout could be initiated as early as 2003.

When the Endangered Species Act passed in 1973, Apache trout was brought under its protection (Public Law 93-205). In 1974, all Arizona waters were closed to the "taking" of Apache trout. The Service directed a recovery team be formed and in 1975, Apache trout was downlisted to threatened status. The threatened status allowed action agencies more flexibility to manage for Apache trout; this has included establishing sport fishing and hatcheries just for Apache trout. The recovery team produced the initial recovery plan in 1979, revised it in 1983, and another draft is currently in preparation.

LITTLE COLORADO SPINEDACE

The Little Colorado spinedace was listed as threatened with critical habitat on October 16, 1987. Forty-four stream miles of critical habitat were designated: 18 mi of East Clear Creek immediately upstream and 13 mi downstream from Blue Ridge Reservoir in Coconino Country, 8 mi of Chevelon Creek in Navajo County, and 5 mi of Nutrioso Creek in Apache County. The spinedace is a cyprinid native to the Little Colorado River (LCR) drainage. This fish occurs in disjunct populations throughout much of the LCR drainage including Apache, Coconino, and Navajo counties.

The species was described in 1874 by E.D. Cope (Miller and Hubbs 1960). Extensive collections summarized by Miller (1963) indicated the spinedace had been extirpated from much of this historic range during the period 1939 to 1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing tributaries off the Mogollon Rim, including the northern slopes of the White Mountains.

The spinedace is a small (about 4 in) minnow with olivaceous, bluish or lead grey coloration. Habitat requirements include a wide range of stream habitats ranging from stagnant pools to permanent flowing water, and with stream substrates ranging from fine sediments to bedrock. Water temperatures in habitats occupied ranged from 58 to 78 degrees Fahrenheit (Miller 1963). Miller (1963) called the spinedace "trout like" in behavior and habitat requirements. Prior to 1900, the spinedace likely used habitats now dominated by nonnative salmonids. Food habits of spinedace include chironomid larvae, dipterians, filamentous green algae and crustaceans (cladocerans) (Runck and Blinn 1993).

Rainbow trout predation on spinedace was demonstrated by Blinn and Runck (1993) in aquaria experiments. Trout obtained from Nutrioso Creek consumed spinedace in aquaria with and without rocks providing cover. Spinedace did not appear capable of avoiding trout predation when placed in aquaria. The largest spinedace consumed by a rainbow trout was 2.8 in; the trout was 9.5 in (Blinn and Runck 1993). However "domesticated" trout obtained from the Page Springs hatchery did not consume spinedace. Robinson et al. (2000) examined stomach contents of 54 rainbow trout captured from Nutrioso Creek and the Little Colorado River and detected no predation on spinedace.

Although the spinedace exhibits a wide tolerance of habitat types, their overall numbers appear to be declining. The primary reasons believed responsible for decline are changes in water quality and quantity, modification of watersheds (dams, road construction), and interactions with nonnative fishes. Spinedace population estimates fluctuate drastically from year to year. Between 1963 and 1966, spinedace were readily found throughout much of the habitat where they had been collected in the recent past, indicating the species ability to persist through severe drought conditions and severe winter temperatures yet repopulate when physical conditions improved. Spinedace are late spring early summer spawners. Five spinedace populations are known to occur within the LCR: Chevelon, Silver, Nutrioso, East Clear Creek, and the LCR proper. Spinedace are currently considered rare in East Clear Creek. However, recent conservation actions in 2000 by AGFD and Coconino National Forest have led to the reintroduction of spinedace into three tributaries (Yeager, Houston Draw, and General Springs) of this drainage. Also, spinedace were collected from Silver Creek in 1997. Many of the spinedace locations are irregularly surveyed, the last collection of spinedace from various populations are summarized below (Table 3). This table does not, however, quantify the number of spinedace, or provide information on population trends, stability, or the quality of the habitat.

Native fishes associated with spinedace include speckled dace, bluehead sucker, Little Colorado sucker, roundtail chub, and Apache trout (USFWS 1998). The list of non-native fishes is much

greater and with varying degrees of potential effects to the spinedace's long-term survival. The presence of nonnatives may have contributed to the current disjunct distribution patterns and the species retreat to what may be suboptimal habitats for spinedace. Nonnative fish may compete with, prey upon, harass, and alter habitat utilized by native fish fauna. Although spinedace numbers fluctuate greatly, overall, their numbers appear to be declining.

Table 3. Known Populations of Little Colorado Spinedace and last known collection date.

SPINEDACE POPULATIONS	Last Year Species documented as of 1994	Last Year Species documented as of 2000
CHEVELON CREEK		
Above The Steps	1994	1998[1]
Hugo Meadow	1994	1998[1]
The Steps	1994	1998[1]
SILVER CREEK		
Silver Creek	1965	1997[1]
Cottonwood Wash	1974	1974
NUTRIOSO CREEK		
Above Forest Service Boundary	1994	2000[1]
Upstream of Nelson	1990	2000[1]
Correjo Crossing	1994	2000[1]
Rudd Creek	1994	1999[1]
EAST CLEAR CREEK		
Above Blue Ridge	1994	1995[1]
Below Blue Ridge	1988	1998[1]
Leonard Canyon – Dines Tank	1994	1999[1]
West Leonard Canyon	1994	2000[1]
Mid-Leonard Canyon	1994	1994[1]
Yeager Canyon	-	2000(stocked)
Houston Draw	-	2000(stocked)
General Springs	-	2000(stocked)
LITTLE COLORADO RIVER		
Downstream of Salado	1939	-
Clear Creek	1960	-
Willow Creek	1965	-
Upstream of Lyman	-	-
Winema	1994	2000[1]
Downstream of Lyman	1994	1995[1]

[1]Date of last survey.

LOACH MINNOW

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS 1986). Critical habitat was designated April 25, 2000 (USFWS 2000). Critical habitat includes portions of the Verde, Black, middle Gila, San Pedro, San Francisco, Tularosa, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks, and several tributaries of those streams.

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette et al. 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by about 85 percent (Miller 1961, Williams et al. 1985, Marsh et al. 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst et al. 1985, Propst et al. 1988, Marsh et al. 1990, Bagley et al. 1995, USBLM 1995, Bagley et al. 1996, Miller 1998).

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst et al. 1988; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feed exclusively on aquatic insects (Schrieber 1978, Abarca 1987). Spawning occurs in March through May (Britt 1982, Propst et al. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst et al. 1988, Vives and Minckley 1990).

When critical habitat was designated for loach minnow, the Service determined the primary constituent elements for loach minnow. These elements include permanent, flowing, unpolluted water; living areas for loach minnow adults, juveniles, and larvae with appropriate flow regimes and substrates; spawning areas; low amounts of fine sediment and substrate embeddedness; riffle, run, and backwater components; low to moderate stream gradients; appropriate water temperatures; periodic natural flooding; an unregulated hydrograph, or, if flows are modified, a hydrograph that demonstrates an ability to support a native fish community; and, habitat devoid of nonnative aquatic species detrimental to loach minnow, or habitat where such nonnative species are at levels which allow persistence of loach minnow. These constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of loach minnow. The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

The status of loach minnow is declining rangewide. Although it is currently listed as threatened, the Service has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994).

BALD EAGLE

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (USFWS 1967), and was reclassified to threatened status on July 12, 1995 (USFWS 1995a). No critical habitat has been designated for this species. The bald eagle was proposed for delisting on July 6, 1999 (USFWS 1999).

The bald eagle is a large bird of prey and is found only in North America. Throughout its range, length varies from 28 to 38 in, wingspread from 66 to 96 in, and weight from 6.5 to 14 lbs. Adults are dark brownish-black, with a white head, neck, and tail. Immature bald eagles are mostly dark without the characteristic white head and tail, and may be confused with golden eagles (*Aquila chrysaetos*). Various documents contain descriptions of the bald eagle's natural history (Grubb 1986, USFWS 1982, Hunt 1998). The most comprehensive natural history accounts can be found in The Ecology of Bald Eagles in Arizona (Hunt et al. 1992), and The Bald Eagle (Stalmaster 1987).

The bald eagle occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major rivers systems, and some seacoast habitats. Generally, suitable habitat for bald eagles includes those areas which provide an adequate food base of fish, waterfowl, and/or carrion, with large trees for perches and nest sites. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and night roosts (USFWS 1995a).

Arizona bald eagles demonstrate some unique behavioral characteristics. In contrast to bald eagles in the remaining lower 48 states, bald eagles in the Southwest frequently construct nests on cliffs. Compared to northern bald eagles, Southern bald eagles, including Arizona, breed earlier in the year. Breeding territories are established in December or January and eggs are laid in January or February. This is believed to be a behavioral adaptation allowing chicks to avoid the extreme heat of midsummer. Young eagles remain in the vicinity of the nest until June (Hunt et al. 1992).

Status and distribution

Rangewide

The bald eagle historically ranged and nested throughout North America except extreme northern Alaska and Canada, and central and southern Mexico. Initial eagle population declines probably began in the late 1800s, and coincided with declines in the number of waterfowl, shorebirds, and

other prey species. Direct killing of bald eagles and the loss of nesting habitat, also contributed to the decline. These factors reduced bald eagle numbers until the 1940s when protection for the bald eagle was provided through the Bald Eagle Protection Act (16 U.S.C. 668). This Act slowed the decline by prohibiting numerous activities adversely affecting bald eagles and by increasing public awareness.

In the 1940s, the widespread use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds for mosquito control and as a general insecticide caused additional declines in bald eagle populations. Reproductive failure, as a result of DDT contamination, was considered a primary cause for the overall decline of bald eagle populations. DDT was banned in the United States in 1972 (USFWS 1995a).

Since listing, bald eagles have increased in number and expanded in range due to the banning of DDT and other persistent organochlorine compounds, habitat protection, and additional recovery efforts. The Service estimates that the breeding population exceeded 5,748 occupied breeding areas in 1998 (USFWS 1999). The largest populations are currently found in Alaska and Canada, although significant populations also occur in Washington, Oregon, Minnesota, Wisconsin, and Michigan.

Arizona

Breeding reports remained sparse until the 1970s, when concern for the species' declining status nationwide spurred surveys to document its breeding range. From 1970 to 1990, 226 known eaglets fledged in Arizona, for an average of 10.8 young produced per year. Successful nests contained an average of 1.6 young per year (Hunt et al. 1992). In 2000, there were 41 known breeding areas, with 37 of those being occupied. Within those breeding areas, 27 nests were active, and ten nests failed. Thirteen of the 27 nests were successful in producing young, and a total of 36+ young hatched. Twenty-two of these young survived to fledged (Driscoll et al. 1999). Since the end of the 2000 breeding season, at least five more breeding areas have been located.

Bald eagle breeding areas in Arizona are predominantly located in the upper and lower Sonoran life zones. The Luna Lake breeding area is one of the few territories in Arizona that is found in coniferous forests, as opposed to the majority which occur in Sonoran vegetation communities. All breeding areas in Arizona are located in close proximity to a variety of aquatic habitats including reservoirs, regulated river systems, and free-flowing rivers and creeks. The alteration of natural river systems has had both beneficial and detrimental affects to the bald eagle. While large portions of riparian forests were inundated or otherwise destroyed following construction of dams and other water developments, the reservoirs created by these structures enhance habitat for the waterfowl and fish species (often nonnative species) on which bald eagles prey. In addition to breeding habitat, Arizona provides habitat for wintering bald eagles, which migrate through the state between October and April each year.

It is not known if the population of bald eagles in Arizona declined as a result of DDT contamination or due to the inconsistency of record keeping during that time period. Although DDT was used in Arizona, most of the breeding habitats in Arizona are in rugged terrain and unsuitable for agricultural development. Therefore, Arizona bald eagles may have avoided the direct effects of DDT (Hunt et al. 1992). The use of DDT in Mexico, however, may have contaminated waterfowl that then migrated through Arizona, as well as directly affected juvenile and subadult eagles that traveled into Mexico.

Although not considered a separate subspecies, bald eagles in the southwestern United States have been considered as a distinct population for the purposes of consultation and recovery efforts under the Act. A recovery plan was developed in 1982 for bald eagles in the Southwest recovery region (USFWS 1982). However, new information has indicated that the bald eagles in Arizona and the Southwest recovery region are not a distinct, reproductively isolated population as was previously believed. The Service proposed delisting of the bald eagle in the lower 48 states including Arizona, stating that the number of breeding pairs in the Southwestern Recovery Unit has more than doubled in the last 15 years (USFWS 1999).

Even though the bald eagle has been reclassified to threatened, and the status of the birds in the Southwest is on an upward trend, the Arizona population remains small and under threat from a variety of factors. Human disturbance of bald eagles is a continuing threat which may increase as numbers of bald eagles increase and human development continues to expand into rural areas (USFWS 1999). The bald eagle population in Arizona is exposed to increasing hazards from the regionally increasing human population. These include extensive loss and modification of riparian breeding and foraging habitat through clearing of vegetation, changes in groundwater levels, and changes in water quality. Threats persist in Arizona largely due to the proximity of bald eagle breeding areas to major human population centers and recreation areas. Additionally, because water is a scarce resource in the Southwest, recreation is concentrated along available water courses. Some of the continuing threats and disturbances to bald eagles include entanglement in monofilament fish line and fish tackle; overgrazing and related degradation of riparian vegetation; malicious and accidental harassment, including shooting, off-road vehicles, recreational activities (especially watercraft), and low-level aircraft overflights; alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures; collisions with transmission lines; poisoning; and electrocution (Stahlmaster 1987). Contamination of Arizona bald eagles by heavy metals has also become a major concern.

The establishment of the Arizona Bald Eagle Management Committee (ABEMC) and Arizona Bald Eagle Nestwatch Program (ABENWP) has been essential to the success of recovery efforts for eagles in the Southwest. The ABENWP coordinates banding of eagles, documents disturbances at nest sites, provides on-site protection, and intervenes as necessary to reduce harassment or as otherwise needed for the benefit of the eagles. This intervention has proven to be very effective in maintaining the southwestern bald eagle population. At least 15 percent of the bald eagle production is due to assistance provided by the Nestwatch program (USFWS

1999). In Arizona, the use of breeding area closures and close monitoring of nest sites through the ABENWP has been and will continue to be essential to the recovery of the species. Ensuring the longevity of the ABENWP is of primary concern to the Service (USFWS 1999).

MEXICAN SPOTTED OWL

The MSO was listed as threatened on March 16, 1993 (USFWS 1993). The Service designated critical habitat for the MSO on February 1, 2001 (USFWS 2001a).

The MSO is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. Several thin white bands mark an otherwise brown tail. Unlike most owls, spotted owls have dark eyes. The range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico, and discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau. While there are no estimates of the owl's historic population size, its historic range and present distribution are thought to be similar.

The Forest Service is the primary administrator of lands occupied by owls in the United States. According to the MSO Recovery Plan (Recovery Plan) (USFWS 1995c), 91 percent of owls known to exist in the United States between 1990 and 1993 occur on land administered by the Forest Service. The majority of known owls have been found within Region 3 of the Forest Service, which includes 11 National Forests in Arizona and New Mexico. Forest Service Regions 2 and 4, which include two National Forests in Colorado and three National Forests in Utah, support fewer owls. A reliable estimate of the numbers of owls throughout its entire range is not currently available.

MSOs breed sporadically and do not nest every year. MSOs' reproductive chronology varies somewhat across the range of the owl. In Arizona, courtship apparently begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey 1988). Eggs are laid in late March, or, more typically, early April. Incubation begins shortly after the first egg is laid, and is performed entirely by the female. The incubation period for the MSO is assumed to be 30 days (Ganey 1988). During incubation and the first half of the brooding period, the female leaves the nest only to defecate, regurgitate pellets, or to receive prey from the male, who does all or most of the foraging (Forsman et al. 1984, Ganey 1988). Eggs usually hatch in early May, with nestling owls fledging four to five weeks later, and then dispersing in mid-September to early October (Ganey 1988).

Little is known about the reproductive output of the MSO. It varies both spatially and temporally (White et al.1995), but the subspecies demonstrates an average annual rate of 1.001 young per pair.

Based on short-term population and radio-tracking studies, and longer-term monitoring studies, the probability of an adult MSO surviving from one year to the next is 0.8 to 0.9. Juvenile survival is considerably lower at 0.06 to 0.29, although it is believed these estimates may be

artificially low due to the high likelihood of permanent dispersal from the study area and the lag of several years before marked juveniles reappear as territory holders and are detected as survivors through recapture efforts (White et al. 1995). Little research has been conducted on the causes of mortality of the MSO, but starvation, accidents or collisions, and predation by great horned owls, northern goshawks, red-tailed hawks, and golden eagles may all be contributing factors.

MSOs nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and that contain mature or old-growth stands which are uneven-aged, multi-storied, and have high canopy closure (Ganey and Balda 1989, USFWS 1991).

Seasonal movement patterns of MSOs are variable. Some individuals are year-round residents within an area, some remain in the same general area but show shifts in habitat-use patterns, and some migrate considerable distances (12-31 mi) during the winter, generally migrating to more open habitats at lower elevations (Ganey and Balda 1989, Willey 1993, Ganey et al. 1998).

MSOs consume a variety of prey throughout their range, but commonly eat small and medium-sized rodents such as woodrats (*Neotoma* spp.), peromyscid mice, and microtine voles. They may also consume bats, birds, reptiles, and arthropods (Ward and Block 1995).

Prey availability is determined by the distribution, abundance, and diversity of prey and by the owl's ability to capture it. Diet studies conducted on MSOs have indicated that prey species of the owl include woodrats (*Neotoma* spp.), white-footed mice (*Peromyscus* spp.), voles (*Microtus* and *Clethrionomys* spp.), rabbits and hares (*Sylvilagus* and *Lepus* spp.), pocket gophers (*Thomomys* spp.), and other animals including a variety of bats, birds, insects, and reptiles. Ward and Block (1995) reported that rangewide, 90 percent of an "average" MSO diet would contain 30 percent woodrats, 28 percent peromyscid mice, 13 percent arthropods, nine percent microtine voles, five percent birds, and four percent medium-sized rodents, mostly diurnal sciurids. These rangewide patterns are not consistent among RUs.

Prey that positively influence MSO survival, reproduction, or numbers may increase the likelihood of persistence of spotted owl populations (USFWS 1995b). Male owls must provide enough food to their female mates during incubation and brooding to prevent abandonment of nests or young; accordingly, ecologists suspect that spotted owls select habitats partially because of the availability of prey (Ward and Block 1995). In two studies in Arizona and New Mexico, Ward and Block (1995) found that the owl's food is most abundant during the summer months when young are being raised. Decreases in prey biomass occur from late fall through the winter. Seasonal decreases like these are typical of small mammal populations. Ward and Block (1995) state that conditions that increase winter food resources will likely improve conditions for the owl because this will increase the likelihood of egg laying and decrease the rate of nest abandonment. Thus, food availability in the winter as well as in the summer is important for owl reproduction.

The Recovery Plan (USFWS 1995c) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Protected habitat includes all known owl sites, and all areas in mixed conifer or pine-oak forests with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years, and all reserved lands. Protected Activity Centers, or PACs, are delineated around known MSO sites. A PAC includes a minimum of 600 acres designed to include the best nesting and roosting habitat in the area. The recommended size for a PAC includes, on average from available data, 75 percent of the foraging area of an owl. The management guidelines for protected areas from the recovery plan are to take precedence for activities within protected areas. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas. The Recovery Plan provides less specific management guidelines for these areas. The Recovery Plan provides no owl specific guidelines for "other habitat".

In Arizona, a total of 11 critical habitat units totaling 830,803 acres were designated as critical habitat. The Service elected to exclude from critical habitat designation on those lands where adequate special management considerations or protection are provided by a legally operative plan or agreement that addresses the maintenance and improvement of the primary constituent elements important to the species, and manages for the long-term conservation of the species. The Service determined that the Southwest Region of the Forest Service amended their Forest Plans in Arizona and New Mexico in 1996 to incorporate the MSO Recovery Plan guidelines as management direction, and, as a result, is providing adequate special management for the MSO. Based on this conclusion, the Service excluded National Forest lands in Arizona and New Mexico from final critical habitat designation. Therefore, no critical habitat for the MSO occurs within the proposed project area.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

A.) Status of the species within the action area

APACHE TROUT

According to the Apache trout draft recovery plan, at least 14 known pure populations currently exist within the historic range in Apache, Gila, and Greenlee counties, on lands administered by the Forest and on the Fort Apache Indian Reservation. These 14 populations represent 13 discrete natural genetic stocks of Apache trout. One introduced population, established out of the historical range in the late 1960s, has been confirmed as unhybridized through genetic analysis.

Ten additional reintroduced populations wait genetic testing to confirm their status. Historically, Apache trout inhabited most of the streams in east-central Arizona's White Mountains above 5,899 ft (Minckley 1973).

Pure Apache trout are currently present within Hayground Creek, Stinky Creek, and Lee Valley Creek. Hybridized Apache trout populations occur within the West Fork Black River, Centerfire Creek, Fish Creek, and Snake Creek. Brown trout, brook trout, and rainbow trout also occur in these streams within both the hybridized and pure populations.

LITTLE COLORADO SPINEDACE

Little Colorado spinedace is found sporadically throughout approximately 40 mi of permanent stream in the Little Colorado River from the town of St. Johns upstream to the permanent headwaters in the White Mountains near the town of Greer. Little Colorado spinedace occur in the Little Colorado River approximately 6 mi downstream of the Forest boundary at the South Fork Little Colorado River. The species and critical habitat also occurs on the Forest in Nutrioso Creek.

LOACH MINNOW

Loach minnow are not present within any of the streams within the action area of the proposed action (USFS 2002b). Critical habitat does occur within the West Fork Black River from its confluence with the East Fork Black River upstream to the confluence of Hayground Creek. The West Fork Black River barrier is located within loach minnow critical habitat.

Loach minnow were first documented in the Black River in 1996 at the Three Forks Crossing (FR 249) (Bagley et. al. 1996). There were no previous records of this species in the Black River system (Minckley 1973). Speculation that these fish were moved there in recent years from elsewhere is not supported by genetic data, which indicate the Black River population of loach minnow is distinct from other known populations (Tom Dowling, Arizona State University, October 31, 2001, pers. comm.). The discovery of this remnant population in such a relatively heavily sampled location points out the difficulty in locating populations of loach minnow and other small native fishes and identifying the extent of their occupied area. Not only are loach minnow usually one of the least numerous of the species found in an area, they are also somewhat secretive, difficult to sample effectively, and are often confused with the more common native speckled dace.

The loach minnow population in the East Fork (EFBR) and North Fork of East Fork (NFEFBR) of the Black River is known to extend from Diamond Rock upstream to about 2 mi above Boneyard Creek (USFWS 1986) and may actually extend further upstream and most probably extends downstream, at least during years of good hydrologic conditions. It is also known to occupy the lower reaches of Boneyard Creek.

BALD EAGLE

Migrant bald eagles may occur in the project area, especially from November through March. Juvenile bald eagles from nests in south-central Arizona may occur in the project area as early as mid-July as transients (Hunt et al. 1992). Adult bald eagles nesting in south-central Arizona may also briefly travel to northern Arizona during June (Hunt et al. 1992). Grubb and Kennedy (1986) report scattered use of the Black River (including the West Fork) by wintering bald eagles. Reservoirs in the vicinity of the Little Colorado River portion of the proposed action are used by wintering bald eagles in varying numbers. In the March of 1993 a dead juvenile (fledged) bald eagle was observed along the South Fork Little Colorado (USFS 2002c).

The species is known to nest near Luna Lake, about 15 to 20 mi from the nearest project site. During recent extensive field reconnaissance of the proposed project areas by the Forest, no indication of nesting bald eagles was observed (USFS 2002c). In addition, in 1998, the AGFD examined 12 osprey nests along the upper Black River and did not observe any bald eagles (Driscoll et al. 1999).

MEXICAN SPOTTED OWL

The action area of the proposed project includes portions of twenty PACs (Table 4). Four of the seven sites proposed for barrier construction or reconstruction are either in a PAC or within ¼ mile of a PAC. Reaches of 9 of 10 streams that will be treated with Antimycin-A and restocked with fish occur within PACs. Suitable habitat for nesting spotted owls (i.e. mixed-conifer forests) that is neither in a PAC, nor inventoried for spotted owls, occurs in 7 of the 10 drainages that will be treated with Antimycin-A and restocked with fish (USFS 2002c).

Table 4: Relationship of the proposed actions to Mexican spotted owl Protected Activity Centers (PACs) and suitable habitat.

Project Site	Within 1/4 mile of Barrier		Walk-through [1] within 1/4		Affected PACs (ID#)	MSO timing restrictions applied[2]:
	PAC	Unsurveyed suitable habitat[3]	PAC	Unsurveyed suitable habitat		
Black River System						
Bear Wallow[4]	n/a[5]	n/a	Yes	Yes	21,22,23,34	Yes: R No: S
Centerfire	Yes	No	n/a	n/a	09	Yes:R
Corduroy	n/a	n/a	Yes	Yes	35	Yes: R No: S
Double Cienega	n/a	n/a	Yes	Yes	05, 35, 36	Yes: R No: S

Fish	Yes (a)	No	Yes (b)	Yes	(a):01,09; (b): 01, 02,	Yes: R,B No: S
Hayground	No	No	No	Yes	None	Yes: R,B No: S
Snake	n/a	n/a	Yes	No	32, 30	Yes: R No: S
Stinky	n/a	n/a	Yes	Yes	07	Yes: R No: S
West Fork Black River	No	No	No	Yes	None	Yes: R No: S, B
Little Colorado System						
East Fork Little Colorado[6]	Yes (a)	No	Yes (b)	No	(a&b): 12	No: R, S, B
South Fork Little	No	No	Yes	Yes	04	No: R, S, B
West Fork Little Colorado	Yes	No	Yes	No	05, 13	No: R, S, B

1 Includes activities associated with fish salvage, antimycin application, fish-kill monitoring, fish stocking
2 R (Salvage, antimycin application, fish-kill monitoring); S (stocking/restocking native fish); B (barrier (re)construction)
3 Includes mixed conifer not in PACs that have not been surveyed within the last 2 years
4 Includes South Fork Bear Wallow
5 Not applicable to this project site; described activity will not occur
6 Includes Lee Valley
7 Includes Bill Riley and Joe Baca Draw

Vegetation in the immediate vicinity of the proposed barrier site on the West Fork Black River is described as ponderosa pine (20 to 30 ft tall; 10 to 12 inch diameter) type with a shrubby riparian community (e.g. *Alnus tenufolia*, *Rosa arizonica*, *Potentilla* sp., *Salix* sp., *Cornus stolonifera*) ranging in height from 1 to 10 ft. Neither the uplands nor the riparian vegetative communities meet the criteria for classification as "Restricted Areas" as described in the Recovery Plan for the MSO (Recovery Plan) (USFWS 1995c).

Habitat at the West Fork Little Colorado River barriers is described as spruce forest with a shrubby semi-riparian community (e.g. *Juniperus communis*, *Rosa arizonica*, *Cornus stolonifera)* ranging in height from 1 to 10 ft. Neither the uplands nor the semi-riparian vegetative communities meet the criteria for "Restricted Areas" in USFWS (1995c). However, because these sites are within PACs, they are considered "Protected Areas" (USFWS 1995c).

Barrier sites on the East Fork Little Colorado River are located in the spruce-fir vegetation type. Trees at the site range from 8 to 30 ft tall, and from 2 to 10 inches in diameter. Vegetation along the drainage bottom includes semi- to non-riparian shrubs (e.g. *Juniperus communis*, *Rosa arizonica*, *Cornus stolonifera, Ribes* sp.) ranging in height from 1 to 15 ft. Neither the spruce-fir, nor the shrub community, meet the criteria for "Restricted Areas" (USFWS 1995c). Both barriers, however, are within a PAC and, therefore, the associated habitats are considered "Protected Areas" (USFWS 1995c).

At the South Fork Little Colorado River barrier sites, the surrounding forest at both barrier sites is described as ponderosa pine, with cottonwood (*Populus angustifolia)* along the stream bottom. The cottonwoods are from 3 to 40 ft tall with diameters from 1 to 20 in. The understory vegetation along the stream bottom consists of dogwood, rose, alder and willow ranging in height from 1 to 15 ft. To be considered a "Riparian Forest" in the context of the Recovery Plan (USFWS 1995c), the area should be "dominated by various species of broadleaved deciduous trees and shrubs" (p. 55). Cottonwood, however, is presently a minor component of the vegetative community along the South Fork, including the two barrier sites. Thus, the areas associated with the two barrier sites on the South Fork do not appear to meet the definition of "Riparian Forest" and are not within "Restricted Areas."

Mixed-conifer habitat ("Restricted Areas") that does not occur in PACs and has not been surveyed occurs in some areas not associated with barrier reconstruction along the Black River system, including portions of Bear Wallow, Corduroy, Double Cienega, Fish, and Hayground creeks, and the West Fork Black River (Table 5). Unsurveyed mixed-conifer habitat similarly occurs along portions of the South Fork Little Colorado (including Bill Riley Creek and Joe Baca Draw) (Table 5).

In general, monitoring of PACs and of suitable habitat not included in PACs has not been done within the last two years to provide current information on the status of spotted owls in the action area of the proposed project. Exceptions to this include PACs located in the South, East, and West Forks of the Little Colorado River (Table 5). Except for a portion of the South Fork Little Colorado River (Table 5), none of the habitat outside PACs has received 2 years of survey for spotted owls within the past two years, and some suitable has likely never been surveyed (USFS 2002c).

Table 5: Summary of recent spotted owl monitoring and survey efforts along the South, East, and West Forks of the Little Colorado River.

PAC No.	1998	1999	2000	2001
04 South Fork Little Colorado River (SFLCR)	Pair present; Roost site 1 mile from SFLCR, over 1 mile from upper barrier	No Monitoring	No owls detected during survey of SFLCR from ½ mile upstream of upper barrier to ½ mile downstream of lower barrier	No owls detected during survey of SFLCR from ½ mile upstream of upper barrier to ½ mile downstream of lower barrier
05 West Fork Little Colorado River above Greer (WFLCR)	Pair confirmed	Male and female found in several locations along slope within ¼ mile of lower barrier of WFLCR	Roost found near top of slope about ¼ mile from lower barrier on WFLCR	No owls detected during 4 surveys

12 East Fork Little Colorado River (EFLCR)	Roost site and 1 young owl near bottom of drainage, 0.2 mi downstream of proposed lower barrier on EFLCR	No owls found in 2 surveys of 1999 roost site	Pair detected on slope about 0.8 mi downstream of lower barrier on EFLCR	Pari and roost tree found on mid-slope about 0.1 mile from lower barrier on EFLCR
13 West Fork Little Colorado River (WFLCR)	Pair detected throughout PAC on slopes along WFLCR	Nest found near bottom of drainage between upper and lower barriers, about 0.7 mi from each, along WFLCR	Pair located within 100 yards of 1999 nest	No owls detected during 4 surveys

In 1996, the Service issued a biological opinion on Forest Service Region 3's adoption of the Recovery Plan recommendations through an amendment of their Forest Plans. In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs, with 92 of those PACs located in the Upper Gila Mountains RU. To date, consultation on individual actions under the amended Forest Plans have resulted in 90 PACs adversely affected, with 50 of those in the Upper Gila Mountains RU.

B. Factors affecting species environment within the action area

BLACK RIVER SYSTEM

The Black River watershed on the Forest currently provides suitable habitat for six species of native fish including the threatened Apache trout, threatened loach minnow, roundtail chub (*Gila robusta*), speckled dace (*Rhinichthys osculus*), Sonora sucker (*Catostomus insignis*), and desert sucker (*Pantosteus clarki*) (USFS 2002a).

VEGETATION

The overstory vegetation in the area of the proposed barrier site on the West fork is dominated by ponderosa pine ranging in height from 20 to 30 ft with diameters from 10 to 12 in. Other woody species include alder (*Alnus oblongifolia*), dogwood (*Cornus stolonifera*), cinquefoil (*Potentilla fruticosa*), willow (*Salix* spp.), and rose (*Rosa arizonica*) ranging in height from 1 to 10 ft. The understory is composed of mesic graminoids and forbs (USFS 2002a).

The overstory vegetation in the areas of the proposed barrier improvement sites on Centerfire, Fish and Hayground creeks is dominated by spruce-fir (Centerfire) and spruce-fir and riparian hardwood (Fish and Hayground). Other woody vegetation includes douglas fir, alder, willow, dogwood, and buckbrush (USFS 2002a).

LOWER COLORADO SYSTEM

The little Colorado River watershed on the Forest currently provides suitable habitat for five species of native fish including the threatened Apache trout, Little Colorado spinedace, speckled dace, bluehead sucker (*Pantosteus discobolus*), and Little Colorado sucker (*Catostomus* sp.) (USFS 2002a).

VEGETATION

The overstory vegetation in the area of the proposed barrier sites on the West Fork is dominated by spruce (*Picea* spp.), ranging in height from 3 to 35 ft with diameters from 2 to 10 in. Other woody species include alder, common juniper (*Juniperus communis*), dogwood, and rose ranging in height from 1 to 10 ft. The understory is composed of mesic graminoids and forbs (USFS 2002a).

The overstory vegetation in the area of the proposed barrier sites on the East Fork is dominated by spruce and corkbark fir (*Abies lasiocarpa* var. *arizonica*) ranging in height from 8 to 30 ft with diameters from 2 to 10 in. Other woody species include common juniper, dogwood, rose, and currant (*Ribes* spp.) Ranging in height from 1 to 15 ft. The understory is composed of mesic graminoids and forbs (USFS 2002a).

The overstory vegetation in the area of the proposed barrier sites South Fork is dominated by ponderosa pine and cottonwood ranging in height from 3 to 40 ft with diameters from 1 to 20 in. Other woody species include dogwood, rose, alder, and willow ranging in height from 1 to 15 ft. The understory is composed of mesic graminoids and forbs (USFS 2002a).

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Direct and Indirect Effects of the Proposed Action

APACHE TROUT

The overall effect of the proposed action, if successful, would be beneficial to the survival and recovery of the Apache trout. However, some adverse effects may occur due to certain characteristics of the sites selected and to ongoing and foreseeable future USFS activities. Since the introduction of Apache trout has been covered under a 10(A)(1)(a) permit, and ongoing Forest management should be addressed in separate consultations, this analyses only addresses

the effects of salvage of pure Apache trout that are already in the stream system, Apache trout moving out of stream reaches or other trout moving in, barrier construction and maintenance, and effects of reintroduction on released Apache trout.

Pure Apache trout are currently present within Hayground (Hay), Stinky, and Lee Valley creeks. Where possible these native fish will be salvaged from all streams being renovated, but some individuals will remain, which will result in mortalities when the streams are treated with Antimycin-A.

Apache trout that are re-stocked in renovated streams probably will not have adverse effects from the use of antimycin-A. Antimycin-A degrades rapidly and most waters can be restocked with fish within 2 weeks of treatment (Gilderhus and Berger 1969). Antimycin-A in water will also be detoxified with the use of potassium permanganate. In addition, antimycin in fish-killing concentrations is largely specific to fish and causes no harm to most of the other aquatic animals. However, data on responses of aquatic invertebrates in Ord Creek (Apache County, Arizona) indicated a dramatic short-term effect by the toxicant Antimycin-A on the invertebrate community. Free living organisms, baetid mayflies, chloroperlid stoneflies, simuliid dipterans, and hydropsychid trichopterans, were killed immediately by the renovation, and drifted downstream (Minckley and Mihalick 1981). However, long-term changes were minimal with regard to numbers, biomass, and diversity of the invertebrate community. These results indicate that there could be a small impact to Apache trout in regards to their food source. This impact will probably be small and will not have a lasting impact on the fish community.

Once imported into the stream reach, there is the possibility that not all Apache trout will survive. Cumulative stress from handling and adaptation to the new habitats may cause harm to some Apache trout. Although the agencies will do their best to reduce stress to the fish, some mortality can be expected from the handling and move.

Once established in the stream reaches, some Apache trout are likely to move out of the stream reaches, particularly during periods of high runoff. Although these fish cannot be managed once they move below the barrier, they remain fully protected under the Act. Predation, hybridization with other trout, and/or competition with the many non-native fish in the Little Colorado and Black rivers is likely.

The possibility of other trout species entering these streams is of great concern. If trout other than Apache trout are observed in these stream reaches, the fish will be removed and the situation evaluated to determine future action.

Barrier-created pools, along with the opportunity to fish for the native Apache trout, could cause an increase in the current level of recreational use on project streams. If this occurs, alterations in aquatic and streamside parameters, along with disturbance to wildlife, could increase. However, some stream reaches are already receiving heavy recreation use levels. Streams not now heavily used by recreationalists are not likely to see an increase in use because of their relatively isolated locations and limited access. The effects of an increase in recreational use in these stream areas are likely to be small.

LITTLE COLORADO SPINEDACE

Activities associated with barrier construction and maintenance, which primarily includes work within the stream channel (both equipment and personnel) and trailing across the stream, would result in impacts to Little Colorado spinedace downstream through increases in sedimentation. It is over 5 mi from the proposed action to known occupied Little Colorado spinedace habitat. According to the EA, the total amount of sediment that could be produced and displaced downstream from construction of both the upper and lower South Fork Little Colorado River fish barriers is less than one cubic yard of predominately fine materials (sand, silt, and clay) (USFS 2002a). However, since spinedace do occur downstream of the project and under unusually high flow conditions some sediment from the project could be transported that far, the spinedace could be affected. This would be a short-term affect and would likely have only a minor effect on spinedace and its habitat.

LOACH MINNOW

Although loach minnow are not present within any of the streams within the action area of the proposed action, critical habitat does occur in the action area. Critical habitat occurs within the West Fork Black River from its confluence with the East Fork Black River upstream to the confluence of Hayground Creek.

Loach minnow are known to occur in the East Fork of the Black River. Barrier construction in the loach minnow critical habitat on the West Fork of the Black River will impede natural recolonization of this habitat. In fact, if properly working, the barriers will impede all fish movement upstream. This could lead to a homogenous fish species environment. However, this could also provide the opportunity for future reintroduction of loach minnow into the critical suitable habitat.

BALD EAGLE

The closest known bald eagle nesting site is at Luna Lake (15 to 20 mi away). The bald eagles breeding at Luna Lake are known to forage primarily at Luna Lake and have been detected at other smaller bodies of water adjacent to Luna Lake such as Lake Sierra Blanca (J. Driscoll, AGFD pers. com). The portions of the Little Colorado River, its forks, and the West Fork of the Black River, where Antimycin-A is being applied, are not known to be within the foraging range of the Luna Lake bald eagles.

Migrant or transient bald eagles may occur in the project area, from November through March. However, wintering eagles are expected to be gone from Arizona in March and as a result, are not expected to be foraging on fish in these streams when Antimycin-A is being used. Wintering eagles likely use the project area, but at an unknown abundance and distribution. No standardized winter bald eagle surveys are conducted along the streams in the project area. The change in future fishery for the fall and winter of 2002 and early winter 2003 is not expected to measurably affect wintering eagles that might use these streams.

If breeding or late wintering bald eagles wander to these drainages, consumption of fish that died from antimycin or drinking water in these streams where antimycin has been used may occur. However, antimycin is not known to effect birds (Schnick 1974). In addition, no effect was reported on turtles, salamanders, frogs (tadpoles and adults), snakes, herons, ducks, and or terns at concentrations toxic to fish (Walker et al. 1964, Gilderhus and Berger 1969).

Because the drainages where the antimycin is expected to be used is not known to occur within the foraging area of known bald eagle breeding areas, the future change in fishery type or abundance is not expected to effect the ability of the birds to successfully reproduce.

MEXICAN SPOTTED OWL

The action area of the proposed project includes portions of twenty PACs. The proposed action will affect some of the MSOs by causing the disruption of various diurnal behaviors of individuals. All activities associated with the proposed action will occur during the daytime, greatly reducing the likelihood of disrupting foraging activities of any spotted owls. These daytime activities, however, may affect roosting owls (during the breeding and non-breeding seasons), and owls tending nests (incubating, brooding young, etc.).

Timing restrictions are proposed for some aspects of the project in the Black River system that would eliminate the implementation of activities during the breeding season of spotted owls from March 1 through August 31 (Table 4). As a result of these timing restrictions, the proposed action will not affect spotted owl breeding during implementation of the renovation-related activities (salvage of fish; application of Antimycin-A) at any of the Black River system sites, nor during the barrier reconstruction activities at Centerfire, Fish, and Hayground Creeks. The reconstruction of existing fish barriers on these creeks will not alter the existing vegetative structure.

The subsequent stocking of fish in proposed systems within the Black River system may occur within the breeding season of spotted owls. Except perhaps in very open, situations (i.e. habitats that are not suitable for spotted owls) where All Terrain Vehicles may be used (Centerfire and Fish Creek), fish stocking activities will involve small numbers of people, and perhaps horses, walking along the creeks and releasing fish into the water. These activities will be of very short-duration and are not likely to disturb owls during the breeding season in a manner that would affect their breeding success or their health.

Activities may occur in the spotted owl breeding season during the construction of the fish barrier on the West Fork Black River. Barrier construction at the West Fork Black River site will not occur within 1/4 mile of a PAC. There is vehicle access all the way to the barrier site, so heavy equipment and vehicles will be throughout the area. Vegetation along the river is not considered restricted or otherwise suitable for spotted owl breeding, although forested habitats in the vicinity of the project site have not been surveyed for the presence of owls. Constructing a barrier will likely take several weeks and cause increased noise levels. However, because of the

lack of spotted owls or, apparently, spotted owl habitat in the vicinity of the action, the construction is not expected to disturb owls during the breeding season in a manner that would affect their breeding success or their health.

No timing restrictions apply to any of the activities proposed for implementation in the Little Colorado River system (Table 4). The Forest could not meet the MSO breeding season timing restrictions on the Little Colorado River system since many of the barriers are being contracted. The number of barriers and locations of streams added to the reason why the Forest could not meet the timing restrictions on the Little Colorado River system. Activities associated with salvaging fish, applying Antimycin-A, and stocking fish are of very short duration and are not likely to disturb owls during the breeding season in a manner that would affect their breeding success or health. Effects from barrier construction are likely to be much noisier and of much longer duration than the "walk-through" type activities.

The construction of barriers on the East Fork and West Fork of the Little Colorado River during the breeding season, however, will occur within three PACs that have been occupied within the last two years. Spotted owls within these three PACs may be affected by activities associated with the construction of these barriers. Depending on the location of the spotted owls during the construction, these effects may result in measurable impacts to the success of nesting owls.

The construction of barriers along the South Fork Little Colorado is less problematic. These barriers are neither within PACs nor were spotted owls detected during surveys of these areas during the last two years. There is vehicle access to the barrier site so heavy equipment will be utilized in this barrier construction. The destruction of some cottonwoods as a result of the barrier construction may alter the forest structure in the areas immediately surrounding the barrier sites. However, because the areas do not meet the definition of a "riparian forest" as presented in the Recovery Plan (USFWS 1995c), these impacts will not conflict with the Recovery Plan.

Roosting non-breeding or dispersing spotted owls may be briefly disturbed during the implementation of the various proposed actions. Presumably, these effects could include awakening from daytime sleep, flushing from one perch site to another, or, in the case of sites at which barriers are being constructed, avoidance of these areas or temporarily leaving the area. The likelihood of non-breeding or dispersing owls being present in the action area is unknown, but the effects are not likely to disturb owls in a manner that would affect their survivorship or their health.

Delaney et al. (1997) reviewed literature on the response of owls and other birds to noise and drew the following conclusions: 1) raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season, 2) birds generally flush in response to disturbance when distances to the source are less than approximately 200 ft and when sound levels are in excess of 95 dBA, and 3) the tendency to flush from a nest declines with experience or habituation to the noise, although the startle response cannot be completely eliminated by habituation. Service policy is to recommend limiting disturbing activities within 1,320 ft of MSO nest sites during the

breeding season (March 1-August 31). In addition, Delaney et al. (1997) found that ground-based disturbances elicited a greater flush response than aerial disturbances.

Owls have more sensitive hearing than other birds (Bowles 1995). The three PACs located immediately adjacent to barrier construction and associated activity will take place during the breeding season. If loud sound arouses an animal, it has the potential to affect its metabolic rate by making it more active. Increased activity can, in turn, deplete energetic reserves (Bowles 1995). Loud human activity can cause raptors to expand their home ranges, but often the birds return to normal use patterns when the humans are not present (Bowles 1995). Such expansions in home ranges could affect the fitness of the birds, and thus their ability to successfully reproduce and raise young. Species that are sensitive to the presence of people may be displaced permanently, which may be more detrimental to wildlife than recreation-induced habitat changes (Hammitt and Cole 1987; Gutzwiller 1995; Knight and Cole 1995). If animals are denied access to areas that are essential for reproduction and survival, then that population will decline. Likewise, if animals are disturbed while performing essential behaviors such as foraging or breeding, that population will also likely decline (Knight and Cole 1995).

Birds may respond to disturbance during the breeding season by abandoning their nests or young, by altering their behavior such that they are less attentive to the young, which increases the risk of the young being preyed upon, or by disrupting feeding patterns, or by exposing young to adverse environmental stress (Knight and Cole 1995). There is also evidence that disturbance during years of a diminished prey base can result in lost foraging time which, in turn, may cause some raptors to leave an area or not to breed at all (Knight and Cole 1995). Disturbances caused by the proposed action could effect the reproductive success of the three PACs in which construction will occur during the breeding season. The effects caused to MSOs by noise, as discussed above, could occur to some extent and cause reproductive failure for some of the owls in the area.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Illegal fishing by anglers not releasing Apache Trout in designated catch and release streams (Hayground and Stinky Creek) may occur. Illegal introduction of rainbow or other non-natives upstream of barriers may also occur. Successful, although illegal, introductions are commonly made to add a new game species or forage species to a native fish community (Taylor et al. In Courtenay and Stauffer 1984). Due to the remote location of most of the streams reaches involved in this project, these activities will likely be limited.

CONCLUSION

APACHE TROUT

After reviewing the current status of the Apache trout, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Apache trout reintroduction project, as proposed, is not likely to jeopardize the continued existence of the Apache trout. No critical habitat has been designated for this species, therefore, none will be affected. We present this conclusion for the following reasons:

1. Although the success of this reintroduction effort is not known, and the long-term survival of the species in the Black River and the Little Colorado River cannot be guaranteed, this action could establish secure, pure, reproductive, self-sustaining populations of Apache trout within its historic habitat.
2. There are fish in captive propagation programs so that the loss of the reintroduced Apache trout would not jeopardize the persistence of the species in the wild.
3. Loss of pure Apache trout in stream reaches treated with Antimycin-A is expected to be minimal.

LITTLE COLORADO SPINEDACE

After reviewing the current status of the Little Colorado spinedace, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Apache trout reintroduction project, as proposed, is not likely to jeopardize the continued existence of the Little Colorado spinedace. Critical habitat for this species has been designated in Nutrioso Creek (Apache County, Arizona), Chevelon Creek (Navajo County, Arizona), and East Clear Creek (Coconino County, Arizona); however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated. We present this conclusion for the following reasons:

1. The Little Colorado spinedace is found in East Clear Creek and its tributaries (Coconino County), Chevelon and Silver creeks (Navajo County), and Nutrioso Creek and the Little Colorado River (Apache County) in Arizona. The proposed action affects a very small portion of the species' range within the Little Colorado River drainage.

2. The effects will be transitory and are expected to be of short duration.

LOACH MINNOW

After reviewing the current status of the loach minnow, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Apache trout reintroduction project, as proposed, is not likely to jeopardize the continued existence of the loach minnow, or result in the destruction or adverse modification of its critical habitat. We present this conclusion for the following reasons:

1. The proposed action affects a very small portion of the species' critical habitat within the Black River drainage and does not significantly impact constituent elements.

2. Loach minnow are not known to be common in this area. Therefore, the effects of the proposed action on the species will be reduced.

BALD EAGLE

After reviewing the current status of the bald eagle, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Apache trout reintroduction project, as proposed, is not likely to jeopardize the continued existence of the bald eagle. No critical habitat has been designated for this species, therefore, none will be affected. We present this conclusion for the following reasons:

1. The population status of the bald eagle continues to improve overall.
2. Breeding bald eagles are not known to forage in the action area.
3. The effects will be transitory and are expected to be of short duration.

MEXICAN SPOTTED OWL

After reviewing the current status of the MSO, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Apache trout reintroduction project, as proposed, is not likely to jeopardize the continued existence of the MSO. Critical habitat for this species has been designated; however, this action does not affect any areas of critical habitat and no destruction or adverse modification of that critical habitat is anticipated. We make these findings for the following reasons:

1. The incidental take anticipated in this opinion falls within the incidental take level anticipated in the non-jeopardy 1996 biological opinion for the MSO and the Forest Service Region 3 Forest Plan Amendments.

2. The loss of reproduction associated with the three PACs discussed in this biological opinion will occur for a period of only two years. Monitoring data will be gathered during this period, and the effects of the action will be assessed at that time.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to

engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

APACHE TROUT

The Service anticipates that after all efforts to salvage Apache trout, 200 Apache trout will be taken during stream renovation to remove non-native salmonid species. This incidental take is expected to be in the form of death caused by the fish toxicant Antimycin-A. In addition, the Service anticipates up to 25% of the total number of released Apache trout will remain in the stream and be taken as a result of this proposed action. This incidental take is expected to be in the form of harassment and/or mortality from handling and from failure to acclimate to a new environment.

LITTLE COLORADO SPINEDACE

The Service does not anticipate that the proposed action will incidentally take any Little Colorado spinedace**.**

LOACH MINNOW

The Service does not anticipate that the proposed action will result in incidental take of loach minnow based on the lack of any known occurrence of loach minnow within or downstream of the action area.

BALD EAGLE

The Service does not anticipate that the proposed action will incidentally take any bald eagles based on the lack of active nests within the proposed action area.

MEXICAN SPOTTED OWL

MSO habitat and designated PACs exist near portions of the project. MSO are known to inhabit three PACs in areas where construction of barriers will occur during the breeding season. If MSO were determined to breed in any or all of the three PACs during project construction, we would anticipate take due to loss of reproduction through disturbance. The Service anticipates take as reproductive failure for three PACs for two years as a result of this proposed action. Therefore, take will occur for six PAC's over the two-year time span of this project.

The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

REASONABLE AND PRUDENT MEASURES

APACHE TROUT

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Apache trout:

1. The Forest shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.
2. The Forest shall minimize direct mortality through maintaining the effectiveness of the barriers.

MEXICAN SPOTTED OWL

The following reasonable and prudent measures are necessary and appropriate to minimize take of MSO:

1. The Forest shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.
2. Personnel education/information programs and well-defined operational procedures shall be implemented.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

APACHE TROUT

The following terms and conditions implement reasonable and prudent measure #1 for Apache trout:

1.1 The Forest shall monitor the project area and that could be affected by the proposed action to ascertain take of individuals of the species. This monitoring will be accomplished using the following protocol:

a. The first year following introduction, assessment of stocking success shall be done visually to minimize impacts and stress to populations.
b. Habitat and fish populations shall be monitored in all Apache trout streams at least every three to five years to determine long-term viability of the population. Surveys should include detailed estimates of population structure, recruitment, water quality characterization, benthic macroinvertebrate analysis and riparian condition.

1.2 Each release site shall be monitored for at least 48 hours following release of Apache trout.

1.3 The Forest shall submit annual monitoring reports to the AESO by December 31, beginning in the year in which the Apache Trout Reintroduction Project begins. These reports shall briefly document the previous calendar year's effectiveness of the terms and conditions, the locations of listed species observed, and, if any are found dead, the suspected cause of mortality. The report shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions.

The following terms and conditions implement reasonable and prudent measure #2:

2.1 Physical barriers installed to protect Apache trout habitat shall be assessed and maintained twice yearly.

MEXICAN SPOTTED OWL

1. The following terms and conditions implement reasonable and prudent measure #1 for MSO:

1.1 The Forest shall monitor the project areas where construction of barriers in PACs to ascertain take of individuals of the species. This monitoring will be accomplished using the following protocol during the year of construction of barriers in PACs:

1.1.1 One survey in March and one survey in April with at least three weeks separating surveys.
1.1.2 Two surveys in May with at least two weeks separating the surveys
1.1.3 A total of two more surveys during the months of June, July, or August with at least four weeks separating surveys.
1.1.4 If at any time the Forest finds a MSO the Forest shall coordinate with us so to re-evaluate these survey requirements.

2. The following terms and conditions implement reasonable and prudent measure #2 for MSO

2.1 All field personnel who implement any portion of the proposed action shall be informed of regulations and protective measures for the MSO. All field personnel shall be informed that intentional killing, disturbance, or harassment of threatened species is a violation of the Act.

2.2 Training shall include Forest Service best management practices, known information about listed species (Mexican spotted owl) habitat, MSO PACs, any nest and/or roost site locations, and information concerning the Act. In particular, emphasis should be placed on the importance of noise disturbance of MSOs during the breeding season.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Forest must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Native Fishes

1. We recommend that the Forest consider using this opportunity of non-native fish removal from the West Fork of the Black River to re-establish loach minnow and other native fish above the barrier.
2. The Forest should consider only allowing stocking of native fish at a watershed level to ensure genetic purity of the Apache trout being reintroduced.

Mexican Spotted Owls

1. To the extent possible, the Forest should consider timing of construction to occur after the incubation period in active PACs.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your February 14, 2002, request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates the Forest's efforts to identify and minimize effects to listed species from this project. For further information please contact Jennifer Graves (x232) or Debra Bills (x239). Please refer to the consultation number, 2-21-02-F-101, in future correspondence concerning this project.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Project Leader, Fisheries Resources Office, Pinetop, AZ
District Ranger, Springerville Ranger District, Springerville, AZ
District Ranger, Alpine Ranger District, Alpine, AZ

John Kennedy, Arizona Game and Fish Department, Phoenix, AZ

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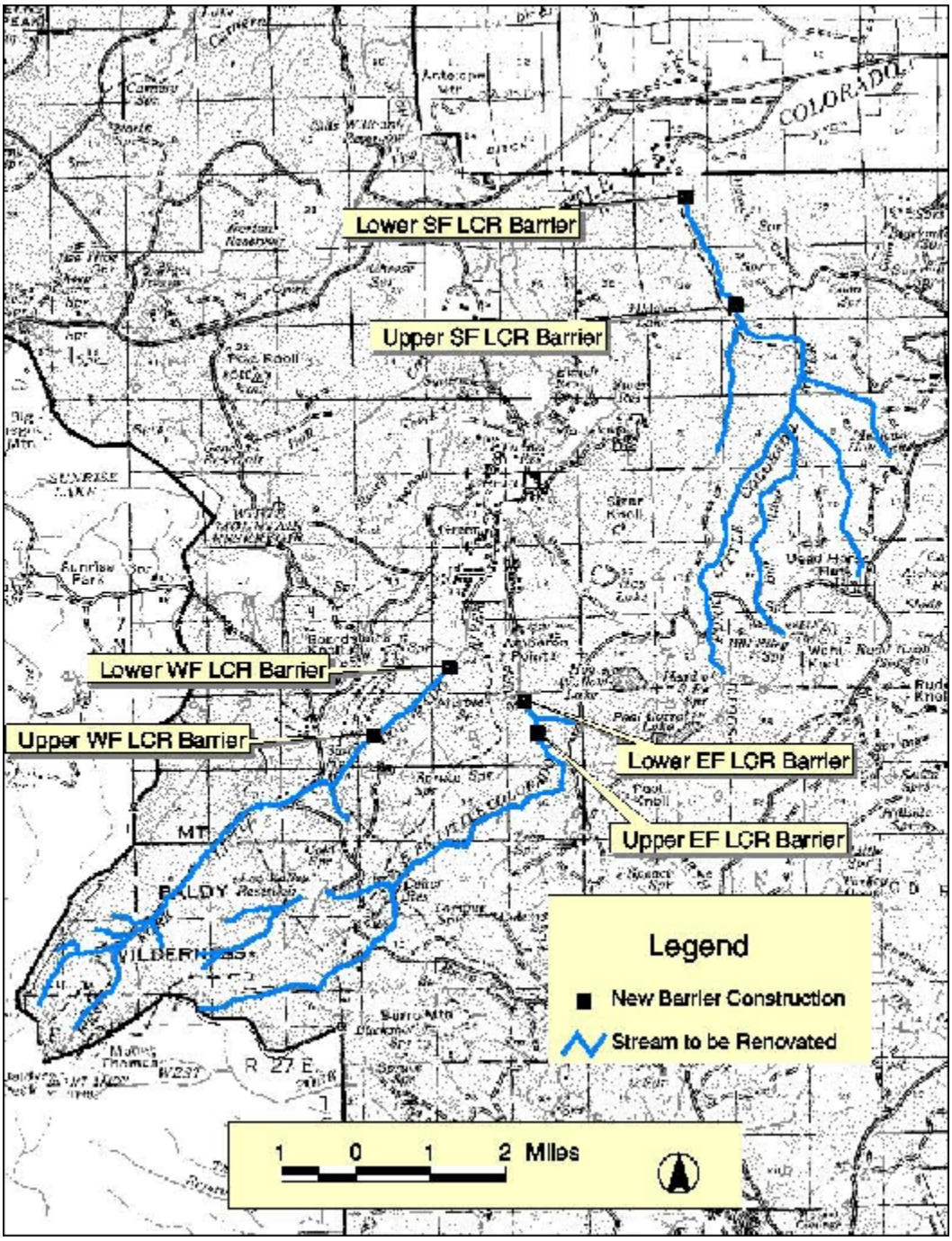
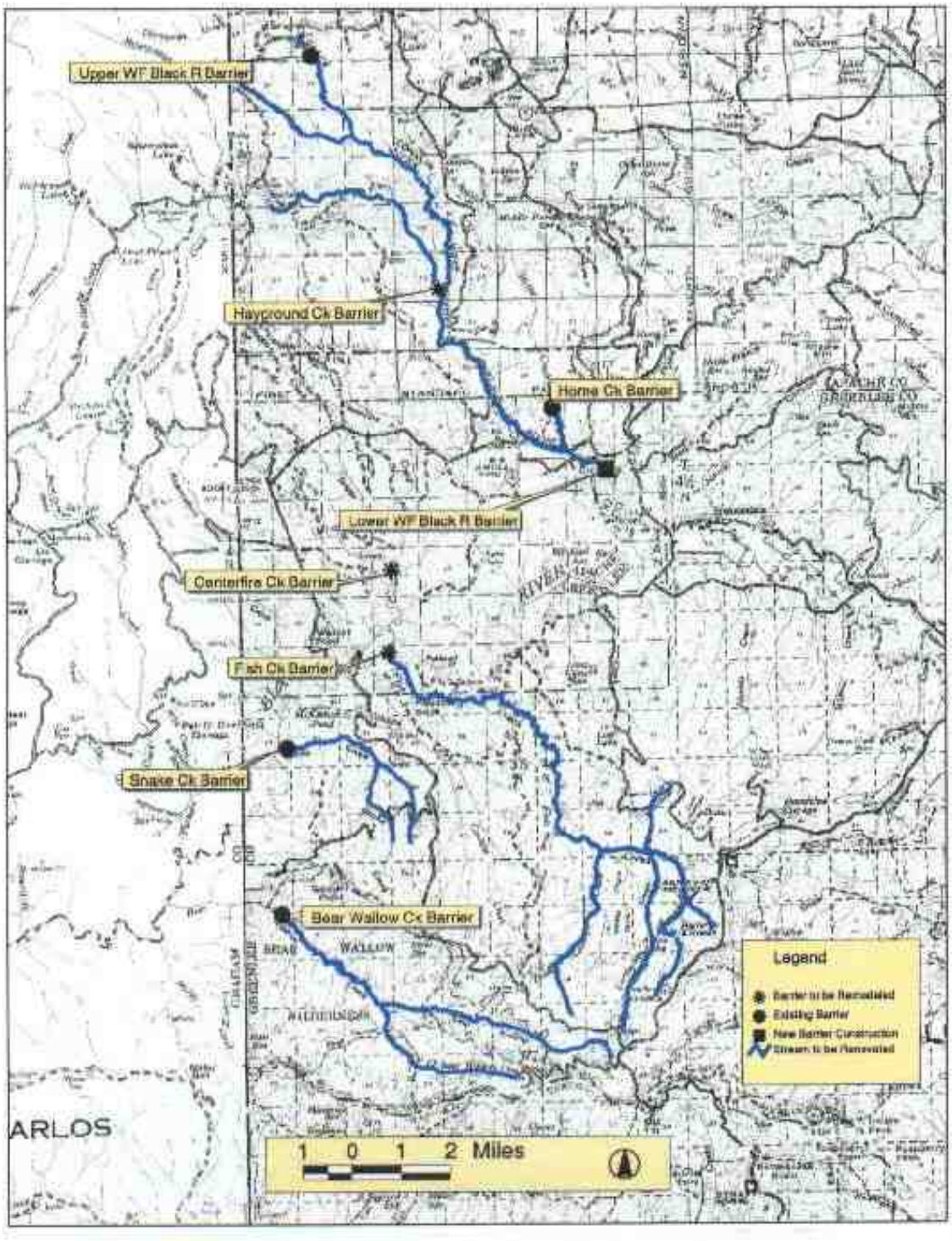
APPENDIX A



Map 1: Proposed Apache trout enhancement project locations within the LCR system on the A-SNFs. Stream renovation (removal of non-native salmonids species above barriers) would be accomplished by the use of Fintrol® (antimycin A) with neutralization by potassium permanganate ($KMnO_4$).



Map 2: Apache trout enhancement project locations within the Black River system on the A-SNFs. Stream renovation (removal of non-native salmonids species above barriers) under would be accomplished by the use of Fintrol® (antimycin A) with neutralization by potassium permanganate ($KMnO_4$).

APPENDIX B

Fish Barrier Construction Requirements and Methodology

The following is a summary for the processes, procedures, and requirements for the construction, additional construction, and maintenance of fish barriers on the Apache-Sitgreaves National Forests. This discussion will include fish barrier site selection, general construction requirements and methods for fish barriers, and specific site information and details for fish barriers associated with this project.

Several factors were considered in determining the locations of the newly constructed barriers proposed in this project. Stream reach locations were selected to maximize habitat connectivity and population viability within the Apache trout recovery streams being analyzed, while minimizing and reducing the impacts and concerns discussed below. Specific physical factors evaluated at the sites included stream gradient, channel/valley type and width, substrate, and stream bank material and vegetation. Other factors evaluated were impacts to other resources and other resource uses, alterations of hydrologic functions and processes at the barrier sites and upstream and downstream of the sites, the proximity of nearby rock sources, and access for equipment, materials, and personnel necessary for construction.

To minimize any potential impacts from high discharge events, once any phase has begun it should then be fully completed. Fish barrier installation will involve several construction phases, these include site preparation, spillway construction, left and right wing construction, spillway cap construction, downstream apron construction, and upstream apron construction and backfilling of the fish barrier. This construction method has been modified from Novotny and Binns (1990), with the primary differences being the addition of rock and mortar or cement constructed caps to the top and downstream side of the spillway, and both the left and right wing structures.

Site preparation is the initial phase of construction, and will prepare the site for several of the subsequent construction phases. All vegetation that has been identified for removal to complete construction will be done at this time. It will also include identifying preferred access routes, camping and personnel locations, and equipment, supplies, and materials staging and storage areas for the various phases of the project.

The second phase will be the construction of the fish barrier within the bank full channel width of the stream, and the top of this structure will be the spillway when the barrier is completed. This phase should be completed under low to moderate stream flows to minimize downstream impacts and localized increases in turbidity.

The third phase of construction is the installation of the right and left wings of the fish barrier. Each wing can be completed independently, or they can be constructed simultaneously.

The fourth phase of construction is the spillway cap construction. This is similar to the final stage of wing construction, and should be done concurrently if possible, to minimize impacts, and labor and equipment needs. This phase must also be done at low to moderate stream flows, and higher air temperatures to ensure structural integrity.

The fifth phase of construction is installation of the downstream apron and armoring on the downstream side of the structure. The downstream apron is the area of the stream channel immediately downstream of the fish barrier, and will be subject to increased erosional forces from water flowing over the fish barrier through the spillway.

The last phase of construction is the installation of the upstream apron and armoring and backfilling of the fish barrier. The upstream apron should be constructed of gabion baskets or large rock (small boulder and large cobble), and this will depend on the size of the main structure and gradient of the stream.

After construction is completed all excess construction materials will be removed from the site. Where construction activities have resulted in increased erosion and loss of vegetative cover, measures will be implemented to prevent sedimentation from entering drainages. These measures could include silt fences, hay bales, seeding, vegetation planting, and mulching where necessary at the barrier sites, access trails and roads, and camping and staging locations. If following barrier construction any areas are identified upstream or downstream of the fish barriers that would be subject to increased erosion will also be stabilized with rock armoring and the measures mentioned above.